it may fairly be concluded that the rationale of each is the same, and that they differ only in the amount of action.

February 15, 1844.

SIR J. W. LUBBOCK, Bart., V.P., in the Chair.

"Some further Observations and Experiments illustrative of the Cause of the Ascent and continued Motion of the Sap," in continuation of a Paper presented to the Royal Society in November 1842. By G. Rainey, Esq. Communicated by P. M. Roget, M.D., Sec. R.S.

The author here gives an account of some experiments which he has lately made, tending, in his opinion, to corroborate the opinions he advanced in his former paper; namely, that the ascending sap is situated in the intercellular and intervascular spaces of the plant, and that its passage into the cells is effected by the action of endosmose, which the intervening membranes, whether living, or deprived of vitality, exert upon that fluid. He found that portions of many plants, such as *Anthriscus vulgaris*, and the *Lapsana communis*, absorb a much larger quantity of fluid when they are immersed in pure water, than when similarly immersed in a solution of gum-arabic; and that, in the latter case, the remaining portion of the solution is of the same specific gravity as before any part has been absorbed by the plant. By a similar process, the author conceives, the fluid which is derived from the earth, and has passed into the intercellular spaces of the cotyledons, are imbibed by its cells by endosmose; while at the same time a fluid containing sugar is passing, by exosmose, out of these cells into the intercellular and intervascular tissue, and thence into the corresponding tissue of the peduncle and young stem; it there meets with, and is diluted by the water ascending in the same tissue from the roots, and the mixture is afterwards distributed over every part of the plant.

February 22, 1844.

SIR J. W. LUBBOCK, Bart., V.P., in the Chair.

"On the Temperature of the Springs, Wells and Rivers of India and Egypt, and of the Sea and Table Lands within the Tropics; with a few Remarks on M. Boussingault's mode of ascertaining the mean temperature of Equinoctial Regions." By Lieut. Newbold, of the Madras Army, F.R.S.

The author adverts to the deficiency of information which has hitherto existed as to the temperature and chemical composition of the springs and rivers both of India and of Egypt; and also as to their geographical and geological relations. He gives, in the present paper, the details of a great number of observations which he has made on these subjects, and which he thinks may prove a useful contribution to Indian hydrography, as well as afford more exact data for philosophical inquiry. The observations extend, at irregular in-

tervals, from Alexandria to Malacca, or from 31° 13′ of northern latitude to within 2° 14′ of the Equator, and between the meridians of 27° and 103° of east longitude. In the columns of the register, the date of the observation, the latitude, longitude, approximate height above the sea, nature of the surrounding geological formation, depth to the surface of the water, depth of the water itself, temperature of the air, and approximate annual mean of the climate in which the wells, &c. occur, are, as far as practicable, specified. A column of remarks is added, containing observations on the chemical nature of the water, and on the size of the wells and springs, and the result obtained by other observers.

It was found, in general, that in low latitudes the temperature of the deepest wells and springs is a little higher than the mean temperature of the air; although there occur a few exceptions, especially in the neighbourhood of a high range of hills, whence there probably arise cold springs, having their source at an elevation considerably above that of the plain where the water makes its appearance. Springs which are strongly saline and sulphureous, have, on the average, a higher temperature than those of pure water. Both saline and cold springs are found occurring within a few feet from thermal and freshwater springs: a fact which the author is disposed to ascribe to their rising through different seams of the subjacent strata, often much inclined; and to the different depths and heights, above and below the crust of the earth, from which the supply of water is derived. Wells, and particularly those having a small surface, which are much used for purposes of irrigation, thereby acquire an artificial increase of temperature. The temperature of shallow exposed wells, springs and rivers, especially those which have sandy beds, is subject to diurnal fluctuation from the more powerful influence of the atmosphere: and the surface water of deep wells partakes of these vicissitudes to a depth varying according to the transparency of the water, the extent of surface, degree of exposure and clearness of the sky. In muddy water, the surface is heated to a greater extent; but at the depth of a foot or two, it is less affected by the heat of the solar rays than clear water.

With regard to Boussingault's proposal of an expeditious mode of ascertaining the approximate mean temperature of equinoctial regions, which consists in sinking a thermometer in the soil, perforated to the depth of about a foot beneath the surface, in a situation sheltered from the direct rays of the sun, from nocturnal radiation, and from the infiltration of water, the author found that the application of this method gave the following results, namely, that the soil at the depth of a foot is subject to an annual, and, in light soils, to a diurnal variation, regulated in its amount by the relative intensity of the solar rays, and the quantity of radiation, depending, of course, on the state of the atmosphere, and the degree of shelter afforded to the surface.